# 1. Application

This document defines the communications method for control of the NEC LCD monitor, MultiSync X461UN /X461HB /X431BT /P401 /P461 /P521 /P701 /S401 /S461 /S521 and MULTEOS M401 /M461 /M521 when using an external controller.

# 2. Connectors and wiring

## 2.1 RS-232C Remote control

Connector: 9-pin D-Sub
Cable: Cross (reversed) cable or null modem cable

(Please refer "Controlling the LCD monitor via RS-232C Remote control" on User's manual.)

## 2.2 LAN control

Connector: RJ-45 10/100 BASE-T
Cable: Category 5 or higher LAN cable

(Please refer "Controlling the LCD monitor via LAN control" on User's manual.)

# 3. Communication Parameter

## 3.1 RS-232C Remote control

| | |
|---|---|
| (1) Communication system | Asynchronous |
| (2) Interface | RS-232C |
| (3) Baud rate | 9600bps |
| (4) Data length | 8bits |
| (5) Parity | None |
| (6) Stop bit | 1 bit |
| (7) Communication code | ASCII |

## 3.2 LAN control

| | |
|---|---|
| (1) Communication system | TCP/IP (Internet protocol suite) |
| (2) Interface | Ethernet (CSMA/CD) |
| (3) Communication layer | Transport layer (TCP)<br>* Using the payload of TCP segment. |
| (4) IP address | (Default) 192.168.0.10<br>* If you need to change,<br>Please refer "Network settings" on User's manual. |
| (5) Port No. | 7142 (Fixed) |

(Note)
The monitor will disconnect the connection if no packet data is received for 15 minutes.
And the controller (PC) has to re-connect to control the monitor again, after 15 minutes or more.

## 3.3 Communication timing

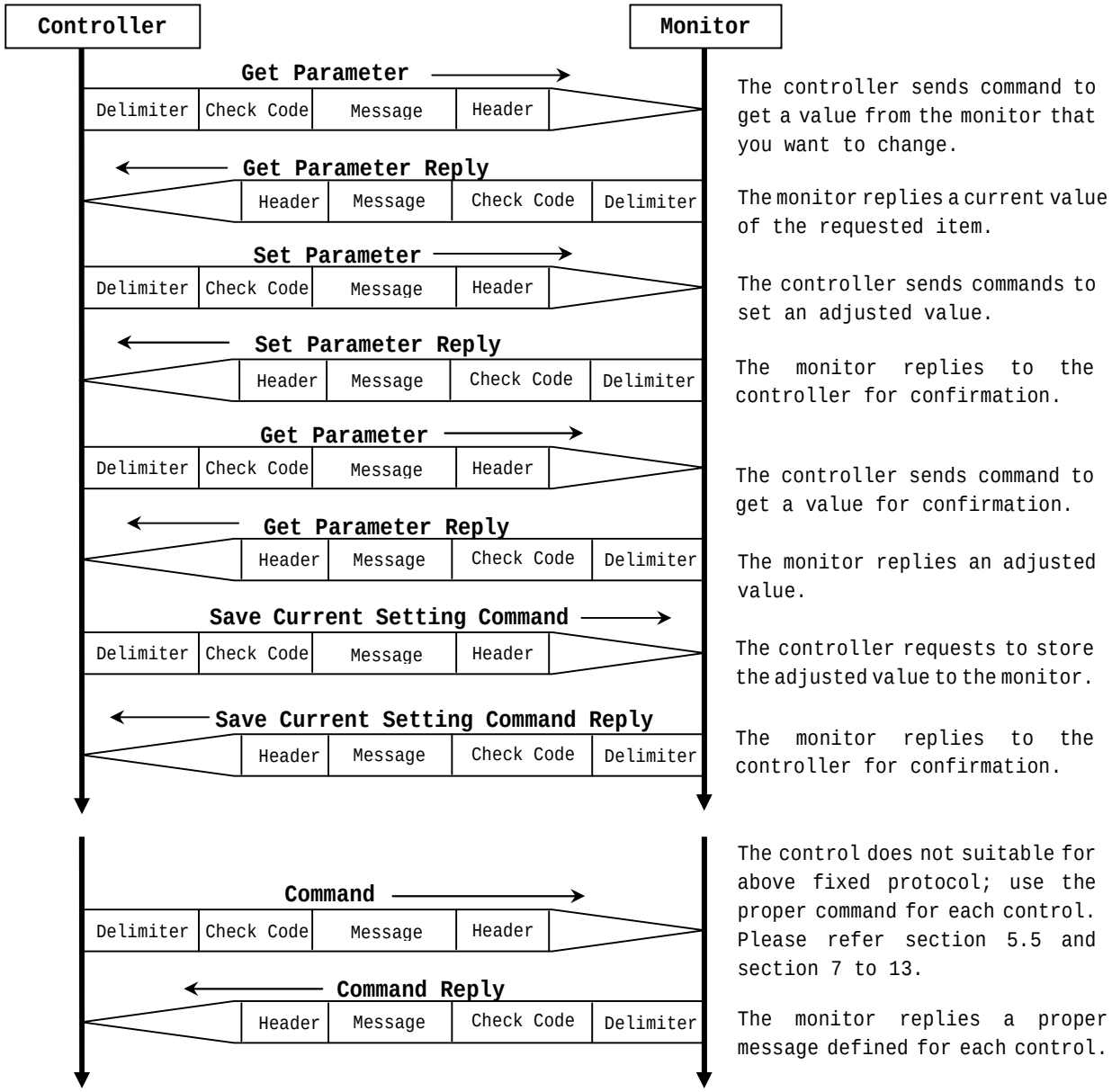
The controller should wait for a packet interval before next command is sent.
The packet interval needs to be longer than 600msec for the LCD monitor.

## 4. Communication Format

| Header | Message | Check Code | Delimiter |
|---|---|---|---|

The command packet consists of four parts, Header, Message, Check code and Delimiter.

Sequence of a typical procedure to control a monitor is as follows,
[A controller and a monitor, two-way communication composition figure]




The controller sends command to get a value from the monitor that you want to change.

The monitor replies a current value of the requested item.

The controller sends commands to set an adjusted value.

The monitor replies to the controller for confirmation.

The controller sends command to get a value for confirmation.

The monitor replies an adjusted value.

The controller requests to store the adjusted value to the monitor.

The monitor replies to the controller for confirmation.

The control does not suitable for above fixed protocol; use the proper command for each control. Please refer section 5.5 and section 7 to 13.

The monitor replies a proper message defined for each control.

### 4.1 Header block format (fixed length)

| **Header** | Message | Check code | Delimiter |
|---|---|---|---|

| SOH | Reserved '0' | Destination | Source | Message Type | Message Length |
|---|---|---|---|---|---|
| 1st | 2nd | 3rd | 4th | 5th | 6th -7th |

1st byte) SOH: Start of Header
ASCII SOH (01h)

2nd byte) Reserved: Reserved for future extensions.

On this monitor, it must be ASCII '0'(30h).

3rd byte) Destination: Destination equipment ID. (Receiver)

Specify a commands receiver's address.

The controller sets the "MONITOR ID" or "GROUP ID" of the monitor controlled in here.

On the reply, the monitor sets '0' (30h), always.

"MONITOR ID", "GROUP ID" to "Destination Address" conversion table is as follows,

| Monitor ID | Destination Address | Monitor ID | Destination Address | Monitor ID | Destination Address | Monitor ID | Destination Address |
|---|---|---|---|---|---|---|---|
| 1 | 41h('A') | 26 | 5Ah('Z') | 51 | 73h | 76 | 8Ch |
| 2 | 42h('B') | 27 | 5Bh | 52 | 74h | 77 | 8Dh |
| 3 | 43h('C') | 28 | 5Ch | 53 | 75h | 78 | 8Eh |
| 4 | 44h('D') | 29 | 5Dh | 54 | 76h | 79 | 8Fh |
| 5 | 45h('E') | 30 | 5Eh | 55 | 77h | 80 | 90h |
| 6 | 46h('F') | 31 | 5Fh | 56 | 78h | 81 | 91h |
| 7 | 47h('G') | 32 | 60h | 57 | 79h | 82 | 92h |
| 8 | 48h('H') | 33 | 61h | 58 | 7Ah | 83 | 93h |
| 9 | 49h('I') | 34 | 62h | 59 | 7Bh | 84 | 94h |
| 10 | 4Ah('J') | 35 | 63h | 60 | 7Ch | 85 | 95h |
| 11 | 4Bh('K') | 36 | 64h | 61 | 7Dh | 86 | 96h |
| 12 | 4Ch('L') | 37 | 65h | 62 | 7Eh | 87 | 97h |
| 13 | 4Dh('M') | 38 | 66h | 63 | 7Fh | 88 | 98h |
| 14 | 4Eh('N') | 39 | 67h | 64 | 80h | 89 | 99h |
| 15 | 4Fh('O') | 40 | 68h | 65 | 81h | 90 | 9Ah |
| 16 | 50h('P') | 41 | 69h | 66 | 82h | 91 | 9Bh |
| 17 | 51h('Q') | 42 | 6Ah | 67 | 83h | 92 | 9Ch |
| 18 | 52h('R') | 43 | 6Bh | 68 | 84h | 93 | 9Dh |
| 19 | 53h('S') | 44 | 6Ch | 69 | 85h | 94 | 9Eh |
| 20 | 54h('T') | 45 | 6Dh | 70 | 86h | 95 | 9Fh |
| 21 | 55h('U') | 46 | 6Eh | 71 | 87h | 96 | A0h |
| 22 | 56h('V') | 47 | 6Fh | 72 | 88h | 97 | A1h |
| 23 | 57h('W') | 48 | 70h | 73 | 89h | 98 | A2h |
| 24 | 58h('X') | 49 | 71h | 74 | 8Ah | 99 | A3h |
| 25 | 59h('Y') | 50 | 72h | 75 | 8Bh | 100 | A4h |
| ALL | 2Ah('*') | | | | | | |

| Group ID | Destination Address | Group ID | Destination Address | Group ID | Destination Address | Group ID | Destination Address |
|---|---|---|---|---|---|---|---|
| A | 31h('1') | D | 34h('4') | G | 37h('7') | J | 3Ah(':') |
| B | 32h('2') | E | 35h('5') | H | 38h('8') | | |
| C | 33h('3') | F | 36h('6') | I | 39h('9') | | |

Ex.) If you want to control a monitor that has the "ID No." as '1', specify a destination address 'A'(41h). If you want to control all of the monitors which are connected by a daisy chain, specify a destination address '*'(2Ah).

4th byte) Source: Source equipment ID. (Sender)

Specify a sender address.

The controller must be '0' (30h).

On the reply, the monitor sets the own MONITOR ID in here.

5th byte) Message Type: (Case sensitive.)

Refer to section 4.2 "Message block format" for more details.

ASCII 'A' (41h): Command.

ASCII 'B' (42h): Command reply.

ASCII 'C' (43h): Get current parameter from a monitor.

ASCII 'D' (44h): "Get parameter" reply.

ASCII 'E' (45h): Set parameter.

ASCII 'F' (46h): "Set parameter" reply.

6th -7th bytes) Message Length:

Specify the length of the message (that follows the header) from STX to ETX.

This length includes STX and ETX.

The byte data must be encoded to ASCII characters.

Ex.) The byte data 3Ah must be encoded to ASCII characters '3' and 'A' (33h and 41h).

The byte data 0Bh must be encoded to ASCII characters '0' and 'B' (30h and 42h).

## 4.2 Message block format

| Header | **Message** | Check code | Delimiter |
|---|---|---|---|

"Message block format" is allied to the "Message Type" in the "Header".

Refer to the section 6 "Message format" for more detail.

1) Get current parameter

The controller sends this message when you want to get the status of the monitor.

For the status that you want to get, specify the "OP code page" and "OP code",

refer to "Appendix A. Operation code table".

"Message format" of the "Get current parameter" is as follows,

| STX | OP code page | | OP code | | ETX |
|---|---|---|---|---|---|
| | Hi | Lo | Hi | Lo | |

➢ Refer to section 5.1 "Get current parameter from a monitor." for more details.

2) Get Parameter reply

The monitor will reply with the status of the requested item specified by the controller in the "Get parameter message".

"Message format" of the "Get parameter reply" is as follows,

| STX | Result | | OP code page | | OP code | | Type | | Max value | | | | Current Value | | | | ETX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hi | Lo | Hi | Lo | Hi | Lo | Hi | Lo | MSB | | | LSB | MSB | | | LSB | |

➢ Refer to section 5.2 "Get parameter reply" for more details.

3) Set parameter

The controller sends this message to change a setting of the monitor.

Message format of the "Set parameter" is as follows,

| STX | OP code page | | OP code | | Set Value | | | | ETX |
|---|---|---|---|---|---|---|---|---|---|
| | Hi | Lo | Hi | Lo | MSB | | | LSB | |

➢ Refer to section 5.3 "Set parameter" for more details.

4) Set Parameter reply

The monitor replies with this message for a confirmation of the "Set parameter message".

Message format of the "Set parameter reply" is as follows,

| STX | Result | | OP code page | | OP code | | Type | | Max value | | | | Requested setting Value | | | | ETX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hi | Lo | Hi | Lo | Hi | Lo | Hi | Lo | MSB | | | LSB | MSB | | | LSB | |

➢ Refer to section 5.4 "Set parameter reply" for more details.

5) Command

"Command message" format depends on each command.

Usually, this "command message" is used for some non-slider controls and some special operations, such as "Save current settings", "Get timing report", "power control", "Schedule", etc. Refer to section 5.5 "Commands message" for more details.

6) Command reply

The monitor replies to a query from the controller.

"Command reply message" format depends on each command.

Refer to section 5.5 "Commands message" for more details.

## 4.5 Check code

| Header | Message | **Check code** | Delimiter |
|---|---|---|---|

Check code is the Block Check Code (BCC) between the Header and the End of Message except SOH.

| | | $2^7$ | $2^6$ | $2^5$ | $2^4$ | $2^3$ | $2^2$ | $2^1$ | $2^0$ |
|---|---|---|---|---|---|---|---|---|---|
| SOH | $D_0$ | | | | | | | | |
| Reserved | $D_1$ | | | | | | | | |
| Destination | $D_2$ | | | | | | | | |
| Source | $D_3$ | | | | | | | | |
| Type | $D_4$ | | | | | | | | |
| Length(H) | $D_5$ | | | | | | | | |
| Length(L) | $D_6$ | | | | | | | | |
| STX | $D_7$ | | | | | | | | |
| Data | $D_8$ | | | | | | | | |
| \| | \| | | | | | | | | |
| \| | \| | | | | | | | | |
| ETX | $D_n$ | | | | | | | | |
| Check code | $D_{n+1}$ | P | P | P | P | P | P | P | P |

$D_{n+1} = D_1$ XOR $D_2$ XOR $D_3$ XOR ,,, $D_n$

XOR: Exclusive OR

Following is an example of a Check code (BCC) calculation.

| Header | | | | | | | Message | | | | | | | | | | Check code (BCC) | Delimiter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOH | Reserved | Destination Address | Source Address | Message type | Message length | | STX | OP code page | | OP code | | Set Value | | | | ETX | | |
| 01 | 30 | 41 | 30 | 45 | 30 | 41 | 02 | 30 | 30 | 31 | 30 | 30 | 30 | 36 | 34 | 03 | 77 | 0D |
| $D_0$ | $D_1$ | $D_2$ | $D_3$ | $D_4$ | $D_5$ | $D_6$ | $D_7$ | $D_8$ | $D_9$ | $D_{10}$ | $D_{11}$ | $D_{12}$ | $D_{13}$ | $D_{14}$ | $D_{15}$ | $D_{16}$ | $D_{17}$ | $D_{18}$ |

Check code (BCC) $D_{17} = D_1$ xor $D_2$ xor $D_3$ xor … xor $D_{14}$ xor $D_{15}$ xor $D_{16}$

= 30h xor 41h xor 30h xor 45h xor 30h xor 41h

xor 02h xor 30h xor 30h xor 31h xor 30h xor 30h

xor 30h xor 36h xor 34h xor 03h

= 77h

## 4.6 Delimiter

| Header | Message | Check code | **Delimiter** |
|---|---|---|---|

Packet delimiter code; ASCII CR(0Dh).

# 5. Message type

## 5.1 Get current Parameter from a monitor.

| STX | OP code page | | OP code | | ETX |
|---|---|---|---|---|---|
| | Hi | Lo | Hi | Lo | |
| 1st | 2nd-3rd | | 4th–5th | | 6th |

Send this message when you want to get the status of a monitor.

For the status that you want to get, specify the "OP code page" the "OP code", refer to "Appendix A. Operation code table".

1st byte) STX: Start of Message

ASCII STX (02h)

2nd-3rd bytes) OP code page: Operation code page.

Specify the "OP code page" for the control which you want to get the status.

Refer to "Appendix A Operation code table" for each item.

OP code page data must be encoded to ASCII characters.

Ex.) The byte data 02h must be encoded to ASCII characters '0' and '2' (30h and 32h).

OP code page 02h -> OP code page (Hi) = ASCII '0' (30h)

OP code page (Lo) = ASCII '2' (32h)

Refer to Operation code table. (Appendix A)

4th–5th bytes) OP code: Operation code

Refer to "Appendix A Operation code table" for each item.

OP code data must be encoded to ASCII characters.

Ex.) The byte data 3Ah must be encoded to ASCII characters '3' and 'A' (33h and 41h).

OP code 3Ah -> OP code (Hi) = ASCII '3' (33h)

OP code (Lo) = ASCII 'A' (41h)

Refer to Operation code table.

6th byte) ETX: End of Message

ASCII ETX (03h)

## 5.2 "Get parameter" reply

| STX | Result | | OP code page | | OP code | | Type | | Max value | | | | Current Value | | | | ETX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hi | Lo | Hi | Lo | Hi | Lo | Hi | Lo | MSB | | | LSB | MSB | | | LSB | |
| 1st | 2nd-3rd | | 4th–5th | | 6th –7th | | 8th -9th | | 10th -13th | | | | 14th -17th | | | | 18th |

The monitor replies with a current value and the status of the requested item (operation code).

1st byte) STX: Start of Message

ASCII STX (02h)

2nd-3rd bytes) Result code.

These bytes indicate a result of the requested commands as follows,

00h: No Error.

01h: Unsupported operation with this monitor or unsupported operation under current condition.

This result code from the monitor is encoded to ASCII characters.

Ex.) The byte data 01h is encoded to ASCII character '0' and '1' (30h and 31h).

4th–5thbytes) OP code page: Operation code page.

These bytes indicate a replying item's OP code page.

This returned value from the monitor is encoded to ASCII characters.

Ex.) The byte data 02h is encoded to ASCII character '0' and '2' (30h and 32h).

Refer to the operation code table.

6th –7thbytes) OP code: Operation code

These bytes indicate a replying item's OP code.

This returned value from the monitor is encoded to ASCII characters.

Refer to the operation code table.

Ex.) The byte data 1Ah is encoded to ASCII character '1' and 'A' (31h and 41h).

8th -9thbytes) Type: Operation type code

00h: Set parameter

01h: Momentary

Like the Auto Setup function which automatically changes the parameter.

This returned value from the monitor is encoded to ASCII characters.

Ex.) The byte data 01h is encoded to ASCII character '0' and '1' (30h and 31h).

10th-13thbytes) Max. value: Maximum value which monitor can accept. (16bits)

This returned value from the monitor is encoded to ASCII characters.

Ex.) '0','1','2' and '3' means 0123h (291)

14th -17thbytes) Current Value: (16bits)

This returned value from the monitor is encoded to ASCII characters.

Ex.) '0','1','2' and '3' means 0123h (291)

18thbyte) ETX: End of Message

ASCII ETX (03h)

## 5.3 Set parameter

| STX | OP code page | | OP code | | Set Value | | | | ETX |
|---|---|---|---|---|---|---|---|---|---|
| | Hi | Lo | Hi | Lo | MSB | | | LSB | |
| 1st | 2nd-3rd | | 4th-5th | | 6th-9th | | | | 10th |

Send this message to change monitor’s adjustment and so on.

The controller requests a monitor to change value.

1stbyte) STX: Start of Message

ASCII STX (02h)

2nd-3rdbytes) OP code page: Operation code page

This OP code page data must be encoded to ASCII characters.

Ex.) The byte data 02h must be encoded to ASCII '0' and '2' (30h and 32h).

Refer to the Operation code table.

4th-5thbytes) OP code: Operation code

This OP code data must be encoded to ASCII characters.

Ex.) OP code 1Ah -> OP code (Hi) = ASCII '1' (31h)

OP code (Lo) = ASCII 'A' (41h)

Refer to the Operation code table.

6th-9thbytes) Set value:(16bit)

This data must be encoded to ASCII characters.

Ex.) 0123h -> 1st(MSB) = ASCII '0' (30h)

2nd = ASCII '1' (31h)

3rd = ASCII '2' (32h)

4th(LSB) = ASCII '3' (33h)

10thbyte) ETX: End of Message

ASCII ETX (03h)

## 5.4 "Set parameter" reply

| STX | Result | | OP code page | | OP code | | Type | | Max value | | | | Requested setting Value | | | | ETX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hi | Lo | Hi | Lo | Hi | Lo | Hi | Lo | MSB | | | LSB | MSB | | | LSB | |
| 1st | 2nd-3rd | | 4th-5th | | 6th-7th | | 8th-9th | | 10th-13th | | | | 14th -17th | | | | 18th |

The Monitor echoes back the parameter and status of the requested operation code.

1stbyte) STX: Start of Message

ASCII STX (02h)

2nd-3rdbytes) Result code

ASCII '0''0' (30h, 30h): No Error.

ASCII '0''1' (30h, 31h): Unsupported operation with this monitor or unsupported operation under current condition.

4th-5thbytes) OP code page: Echoes back the Operation code page for confirmation.

Reply data from the monitor is encoded to ASCII characters.

Ex.) OP code page 02h -> OP code page = ASCII '0' and '2' (30h and 32h)

Refer to Operation code table.

6th-7thbytes) OP code: Echoes back the Operation code for confirmation.

Reply data from the monitor is encoded to ASCII characters.

Ex.) OP code 1Ah -> OP code (Hi) = ASCII '1' (31h)

OP code (Lo) = ASCII 'A' (41h)

Refer to Operation code table

8th-9thbytes) Type: Operation type code

ASCII '0''0' (30h, 30h): Set parameter

ASCII '0''1' (30h, 31h): Momentary

Like Auto Setup function, that automatically changes the parameter.

10th-13thbytes) Max. value: Maximum value that monitor can accept. (16bits)

Reply data from the monitor is encoded to ASCII characters.

Ex.) '0''1''2''3' means 0123h (291)

14th -17thbytes) Requested setting Value: Echoes back the parameter for confirmation. (16bits)

Reply data from the monitor is encoded to ASCII characters.

Ex.) '0''1''2''3' means 0123h (291)

18thbyte) ETX: End of Message

ASCII ETX (03h)

## 5.5 Commands

"Command message format" depends on each command. Some commands are shown with usage. Refer to section 7 to 13.

### 5.5.1 Save Current Settings.

The controller requests for the monitor to store the adjusted value.

| STX | Command code | | ETX |
|---|---|---|---|
| | '0' | 'C' | |

- Send "OC"(30h, 43h) as Save current settings command.
- Complete "Save Current setting" command packet as follows;

ASCII: 01h-30h-41h-30h-41h-30h-34h-02h-30h-43h-03h-CHK-0Dh

SOH-'0'-'A'-'0'-'A'-'0'-'4'-STX-'0'-'C'-ETX-CHK- CR

The monitor replies the packet for confirmation as follows;

SOH-'0'-'0'-'A'-'B'-'0'-'6'-STX-'0'-'0'-'0'-'C'-ETX-CHK- CR

### 5.5.2 Get Timing Report and Timing reply.

The controller requests the monitor to report the displayed image timing.

| STX | Command code | | ETX |
|---|---|---|---|
| | '0' | '7' | |

- Send "07"(30h, 37h) as Get Timing Report command.
- Complete "Get Timing Report" command packet as follows;

ASCII: 01h-30h-41h-30h-41h-30h-34h-02h-30h-37h-03h-CHK-0Dh

SOH-'0'-'A'-'0'-'A'-'0'-'4'-STX-'0'-'7'-ETX-CHK- CR

The monitor replies status as the following format;

| STX | Command | | SS | | H Freq. | | | | V Freq. | | | | ETX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | '4' | 'E' | Hi | Lo | MSB | | | LSB | MSB | | | LSB | |

- SS: Timing status byte

  Bit 7 = 1: Sync Frequency is out of range.
  Bit 6 = 1: Unstable count

Bit 5-2 Reserved (Don't care)
Bit 1 1:Positive Horizontal sync polarity.
0:Negative Horizontal sync polarity.
Bit 0 1:Positive Vertical sync polarity.
0:Negative Vertical sync polarity.

- H Freq: Horizontal Frequency in unit 0.01kHz
- V Freq: Vertical Frequency in unit 0.01Hz

Ex.) When H Freq is '1''2''A''9' (31h, 32h, 41h, 39h), it means 47.77kHz.

### 5.5.3 NULL Message

| STX | Command code | | ETX |
|---|---|---|---|
| | 'B' | 'E' | |

The NULL message returned from the monitor is used in the following cases;

- A timeout error has occurred. (The default timeout is 10sec.)
- The monitor receives an unsupported message type.
- The monitor detects a packet BCC (Block Check Code) error.
- To tell the controller that the monitor does not have any answer to give to the host (not ready or not expected)
  - Following operations need a certain time for to execute, so the monitor will return this message when another message is received during execution.
    - ✧ Power ON, Power OFF, Auto Setup, Input, PIP Input, Auto Setup and Factory reset.
- Complete "NULL Message" command packet as follows;

01h-30h-30h-41h-42h-30h-34h-02h-42h-45h-03h-CHK-0Dh

SOH-'0'-'0'-'A'-'B'-'0'-'4'-STX-'B'-'E'-ETX-CHK- CR

## 6. Typical procedure example

The following is a sample of procedures to control the monitor, these are examples of "Get parameter", "Set parameter" and "Save current settings".

### 6.1. How to change the “Brightness” setting.

Step 1. The controller requests the Monitor to reply with the current brightness setting and capability to support this operation. (Get parameter)

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'C'-'0'-'6' | STX-'0'-'0'-'1'-'0'-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID from which you want to get a value.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'C' (43h): Message type is "Get parameter command".
'0'-'6' (30h, 36h): Message length is 6 bytes.

Message
STX (02h): Start of Message
'0'-'0' (30h, 30h): Operation code page number is 0.
'1'-'0' (31h, 30h): Operation code is 10h (in the OP code page 0).
ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

Step 2. The monitor replies with current Brightness setting and capability to support this operation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'D'-'1'-'2' | STX-'0'-'0'-'0'-'0'-'1'-'0'-'0'-'0'<br>-'0'-'0'-'6'-'4'-'0'-'0'-'3'-'2'-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  '0' (30h): Message receiver is the controller.
  Monitor ID: Indicate a replying Monitor ID.
              Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
  'D' (44h): Message Type is "Get parameter reply".
  '1'-'2' (31h, 32h): Message length is 18 bytes.

Message
  STX (02h): Start of Message
  '0'-'0' (30h, 30h): Result code.  No error.
  '0'-'0' (30h, 30h): Operation code page number is 0.
  '1'-'0' (31h, 30h): Operation code is 10h (in the page 0).
  '0'-'0' (30h, 30h): This operation is "Set parameter" type.
  '0'-'0'-'6'-'4' (30h, 30h, 36h, 34h): Brightness max value is 100(0064h).
  '0'-'0'-'3'-'2' (30h, 30h, 33h, 32h): Current Brightness setting is 50(0032h) .
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

Step 3. The controller request the monitor to change the Brightness setting

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'E'-'0'-'A' | STX-'0'-'0'-'1'-'0'-'0'-'0'-'5'-'0'-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID of which you want to change a setting.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller .
  'E' (45h): Message Type is "Set parameter command".
  '0'-'A' (30h, 41h): Message length is 10 bytes.

Message
  STX (02h): Start of Message
  '0'-'0' (30h, 30h): Operation code page number is 0.
  '1'-'0' (31h, 30h): Operation code is 10h (in the page 0).
  '0'-'0'-'5'-'0' (30h, 30h, 35h, 30h): Set Brightness setting 80(0050h).
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter

CR (0Dh): End of packet

Step 4. The monitor replies with a message for confirmation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'- Monitor ID -'F'-'1'-'2' | STX-'0'-'0'-'0'-'0'-'1'-'0'–'0'-'0'-'0'<br>-'0'-'6'-'4'-'0'-'0'-'5'-'0'-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'F' (46h): Message Type is "Set parameter reply".
'1'-'2' (31h, 32h): Message length is 18 bytes.

Message
STX (02h): Start of Message
'0'-'0' (30h, 30h): Result code. No error.
'0'-'0' (30h, 30h): Operation code page number is 0.
'1'-'0' (31h, 30h): Operation code is 10h (in the page 0).
'0'-'0' (30h, 30h): This operation is "Set parameter" type.
'0'-'0'-'6'-'4' (30h, 30h, 36h, 34h): Brightness max value is 100(0064h).
'0'-'0'-'5'-'0' (30h, 30h, 35h, 30h): Received a Brightness setting was 80(0050h) .
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

➢ Repeat Step 1 and Step 2, if you need to check the Brightness setting. (Recommended)
Step 5. Request the monitor to store the Brightness setting. (Save Current Settings Command)

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'4' | STX-'0-'C'-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID which you want to store the setting.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-'4' (30h, 34h): Message length is 4 bytes.

Message
STX (02h): Start of Message
'0'-'C' (30h, 43h): Command code is 0Ch as "Save current settings".
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

## 6.2. How to read the measurement value of the built-in temperature sensors.

MultiSync X461UN /X461HB /X431BT /P401 /P461 /P521 /P701 /S401 /S461 /S521 and MULTEOS M401 /M461 /M521 have three built-in temperature sensors.

The controller can monitor inside temperatures by using those sensors with external control.

The following shows the procedure for reading the temperatures from the sensors.

Step 1. Select a temperature sensor which you want to read.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'E'-'0'-'A' | STX-'0'-'2'-'7'-'8'-'0'-'0'-'0'-'1'-ETX | BCC | CR |

Header
  SOH (01h): Start of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID which you want to get a value.
            Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'E' (45h): Message Type is "Set parameter command".
  '0'-'A' (30h, 41h): Message length is 10 bytes.

Message
  STX (02h): Start of Message
  '0'-'2' (30h, 32h): Operation code page number is 2.
  '7'-'8' (37h, 38h): Operation code is 78h (on page 2).
  '0'-'0'-'0'-'1' (30h, 30h, 30h, 31h): Select the temperature sensor #1 (01h).
           00h: No meaning
           01h: Sensor #1
           02h: Sensor #2
           03h: Sensor #3
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

Step 2. The monitor replies for confirmation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'F'-'1'-'2' | STX-'0'-'0'-'0'-'2'-'7'-'8'-'0'-'0'-'0'-'0'-'0'-'3'-'0'-'0'-'0'-'1'-ETX | BCC | CR |

Header
  SOH (01h): Start of Header
  '0' (30h): Reserved
  '0' (30h): Message receiver is the controller.
  Monitor ID: Indicates a replying Monitor ID.
             Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
  'F' (46h): Message Type is "Set parameter reply".
  '1'-'2' (31h, 32h): Message length is 18 bytes.

Message
  STX (02h): Start of Message
  '0'-'0' (30h, 30h): Result code.  No error.
  '0'-'2' (30h, 32h): Operation code page number is 2.
  '7'-'8' (37h, 38h): Operation code is 78h (in the page 2).
  '0'-'0' (30h, 30h): This operation is "Set parameter" type.
  '0'-'0'-'0'-'3' (30h, 30h, 30h, 33h): Number of temperature sensors are 3 (0003h).
  '0'-'0'-'0'-'1' (30h, 30h, 30h, 31h): temperature sensor is #1.
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
     Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

Step 3. The controller requests the monitor to send the temperature from the selected sensor.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'C'-'0'-'6' | STX-'0'-'2'-'7'-'9'-ETX | BCC | CR |

Header
  SOH (01h): Start of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID which you want to get a value.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'C' (43h): Message Type is "Get parameter".
  '0'-'6' (30h, 36h): Message length is 6 bytes.

Message
  STX (02h): Start of Message
  '0'-'2' (30h, 32h): Operation code page number is 2.
  '7'-'9' (37h, 39h): Operation code is 79h (in the page 2).
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

Step 4. The monitor replies a temperature of selected sensor.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'D'-'1'-'2' | STX-'0'-'0'-'0'-'2'-'7'-'9'-'0'-'0'<br>-'F'-'F'-'F'-'F'-'0'-'0'-'3'-'2'-ETX | BCC | CR |

Header
  SOH (01h): Start of Header
  '0' (30h): Reserved
  '0' (30h): Message receiver is the controller.
  Monitor ID: Indicate a replying Monitor ID.
              Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
  'D' (44h): Message Type is "Get parameter reply".
  '1'-'2' (31h, 32h): Message length is 18 bytes.

Message
  STX (02h): Start of Message
  '0'-'0' (30h, 30h): Result code.  No error.
  '0'-'2' (30h, 32h): Operation code page number is 2.
  '7'-'9' (37h, 39h): Operation code is 79h (in the page 2).
  '0'-'0' (30h, 30h): This operation is "Set parameter" type.
  'F'-'F'-'F'-'F' (46h, 46h, 46h, 46h): Maximum value.
  '0'-'0'-'3'-'2' (30h, 30h, 33h, 32h): The temperature is 25 degrees Celsius.

Readout value is 2's complement.

| Temperature[Celsius] | Readout value | |
|---|---|---|
| | Binary | Hexadecimal |
| +125.0 | 0000 0000 1111 1010 | 00FAh |
| + 25.0 | 0000 0000 0011 0010 | 0032h |
| +  0.5 | 0000 0000 0000 0001 | 0001h |
| 0 | 0000 0000 0000 0000 | 0000h |
| -  0.5 | 1111 1111 1111 1111 | FFFFh |
| - 25.0 | 1111 1111 1100 1110 | FFCEh |
| - 55.0 | 1111 1111 1001 0010 | FF92h |

  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

# 7. Power control procedure

## 7.1 Power status read

1) The controller requests the monitor to reply a current power status.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'6' | STX-'0'-'1'-'D'-'6'-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID from which you want to get status.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'A' (41h): Message Type is "Command".
  '0'-'6' (30h, 36h): Message length is 6 bytes.

Message
  STX (02h): Start of Message
  '0'-'1'-'D'-'6': Get power status command.
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

2) The monitor returns with the current power status.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'1'-'2' | STX-'0'-'2'-'0'-'0'-'D'-'6'-'0'-'0'-'0'<br>-'0'-'0'-'4'-'0'-'0'-'0'-'1'-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  '0' (30h): Message receiver is the controller.
  Monitor ID: Indicate a replying Monitor ID.
              Ex.)  When this byte is set to 'A', the replying Monitor ID is '1'.
  'B' (42h): Message Type is "Command reply".
  '1'-'2' (31h, 32h): Message length is 18 bytes.

Message
  STX(02h):Start of Message
  '0'-'2' (30h, 32h): Reserved data
  '0'-'0' (30h, 30h): Result code
                  00: No Error.
                  01: Unsupported.
  'D'-'6'(44h, 36h): Display power mode code
  '0'-'0' (30h, 30h): Parameter type code is "Set parameter".
  '0'-'0'-'0'-'4' (30h, 30h, 30h, 34h): Power mode is 4 types.
  '0'-'0'-'0'-'1' (30h, 30h, 30h, 31h): Current power mode
                                  <Status>

0001: ON
0002: Stand-by (power save)
0003: Suspend (power save)
0004: OFF (same as IR power off)

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

## 7.2 Power control

1) The controller requests the monitor to control monitor power.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'C' | STX-'C'-'2'-'0'-'3'-'D'-'6'-'0'-'0'-'0'-'1'-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID which you want to change a setting.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-'C (30h, 43h): Message length is 12 bytes.

Message
STX (02h): Start of Message
'C'-'2'-'0'-'3'-'D'-'6' (43h, 32h, 30h, 33h, 44h, 36h): power control command
'0'-'0'-'0'-'1' (30h, 30h, 30h, 31h): Power mode
0001: ON
0002, 0003: Do not set.
0004: OFF (same as the power off by IR)
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies a data for confirmation.

| Header | Message | Check ode | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'0'-'E' | STX-'0'-'0'-'C'-'2'-'0'-'3'-'D'-'6'-'0'-'0'-'0'-'1'-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'N'-'N': Message length
Note.) The maximum data length that can be written to the monitor at a time is 32bytes.
Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

Message
STX (02h): Start of Message

'0'-'0' (30h, 30h): Result code. No error.
'C'-'2','0'-'3'-'D'-'6' (43h, 32h, 30h, 33h, 44h, 36h): power control reply command
- The monitor replies same as power control command to the controller.

'0'-'0'-'0'-'1' (30h, 30h, 30h, 31h): Power mode
0001: ON
0002, 0003: Do not set.
0004: OFF (same as the power off by IR)

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

# 8. Asset Data read and write

MultiSync X461UN /X461HB /X431BT /P401 /P461 /P521 /P701 /S401 /S461 /S521 and MULTEOS M401 /M461 /M521 have the area for to store user's asset data of up to 64bytes.

## 8.1 Asset Data Read Request and reply

This command is used in order to read Asset Data.

1) The controller requests the monitor to reply with Asset data.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'A' | STX-'C'-'0'-'0'-'B'-'0'-'0'-'2'-'0'-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID from which you want to get data.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-'A' (30h, 41h): Message length is 10 bytes.

Message
STX (02h): Start of Message
'C'-'0'-'0'-'B' (43h, 30h, 30h, 42h): Asset read request command.
'0'-'0' (30h, 30h): Offset data from top of the Asset data.
At first set 00h: Read data from the top of Asset data area.
'2'-'0' (32h, 30h): Read out data length is 32bytes.
Secondly set 20h: Read data from the 32bytes offset point in the Asset data area.
Maximum readout length is 32bytes at a time.
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies Asset data to the controller.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-N-N | STX-'C'-'1'-'0'-'B'-<br>Data(0)-Data(1)---Data(N)-ETX | BCC | CR |

Header
SOH (01h): Start of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.

'B' (42h): Message type is "Command reply"
N-N: Message length
Ex.) The byte data 20h is encoded to ASCII characters '2' and '0' (32h and 30h).
Note.) This length includes STX and ETX.

Message
STX (02h): Start of Message
'C'-'1'-'0'-'B' (43h, 31h, 30h, 42h): Asset read reply command
Data(0) – Data(N): Retuned Asset data
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

## 8.2 Asset Data write

This command is used in order to write Asset Data.

1) The controller requests the monitor to write Asset data.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-N-N | STX-'C'-'0'-'0'-'E'-'0'-'0'-<br>Data(0)-Data(1)---Data(N)-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID in which you want to write data.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
N-N: Message length
Note.) The maximum data length that can be written to the monitor at a time is 32bytes.
Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

Message
STX (02h): Start of Message
'C'-'0'-'0'-'E' (43h, 30h, 30h, 45h): Asset Data writes command
'0'-'0'(30h, 30h): Offset address from top of Asset data.
00h : Write data from top of the Asset data area.
Data(0) –- Data(N): Asset data. The data must be ASCII characters strings.
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies a data for confirmation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-N-N | STX-'0'-'0'-'C'-'0'-'0'-'E'-'0'-'0'-<br>Data(0)-Data(1)---Data(N)-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
N-N: Message length

Note.) The maximum data length that can be written to the monitor at a time is 32bytes.
Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (34h and 30h).

Message
STX (02h): Start of Message
'0'-'0': Result code. No error.
'C'-'0'-'0'-'E' (43h, 30h, 30h, 45h): Asset Data write command
'0'-'0'(30h, 30h): Offset address from top of Asset data.
00h : Write data into from top of the Asset data area.
Data(0) -- Data(N): Asset data. The data must be ASCII characters strings.
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

# 9. Date & Time read and write

## 9.1 Date & Time Read

This command is used in order to read the setting of Date & Time.

1) The controller requests the monitor to reply with the Date & Time.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'6' | STX-'C'-'2'-'1'-'1'-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID of which you want to get status.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-'6'(30h, 36h): Message length

Message
STX (02h): Start of Message
'C'-'2'-'1'-'1' (43h, 32h, 31h, 31h): Date & time read request command.
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies Date & Time to the controller.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'1'-'4' | STX-'C'-'3'-'1'-'1'-YY-MM-DD-WW-HH-MN -DS-ETX | BCC | CR |

Header
SOH (01h): Start of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller
Monitor ID: Indicate a replying Monitor ID
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply"
'1'-'4'(31h, 34h): Message length

Message
STX (02h): Start of Message

'C'-'3'-'1'-'1' (43h, 33h, 31h, 31h): Date & Time read reply command
'YY'-'MM'-'DD'-'WW'-'HH'-'MN'-'DS': Date & Time data
YY: Year (offset 2000)
'0'-'0'(30h, 30h): 2000
|
'6'-'3'(36h, 33h): 2099 (99 = 63h)

MM: Month
'0'-'1'(30h, 31h): January
|
'0'-'C'(30h, 43h): December

DD: Day
'0'-'1'(30h, 31h): 1
|
'1'-'E'(31h, 45h): 30(=1Eh)
'1'-'F'(31h, 46h): 31(=1Fh)

WW: weekdays
'0'-'0'(30h, 30h): Sunday
'0'-'1'(30h, 31h): Monday
'0'-'2'(30h, 32h): Tuesday
'0'-'3'(30h, 33h): Wednesday
'0'-'4'(30h, 34h): Thursday
'0'-'5'(30h, 35h): Friday
'0'-'6'(30h, 36h): Saturday

HH: Hours
'0'-'0'(30h, 30h): 0
|
'1'-'7'(31h, 37h): 23 (=17h)

MN: Minutes
'0'-'0'(30h, 30h): 0
|
'3'-'B' (33h, 42h): 59 (=3Bh)

DS: Daylight saving (Summer time)
'0'-'0'(30h, 30h): NO
'0'-'1'(30h, 31h): YES

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

## 9.2 Date & Time Write

This command is used in order to write the setting of the Date & Time.

1) The controller requests the monitor to write Date & Time.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'1'-'2' | STX-'C'-'2'-'1'-'2'-YY-MM-DD-WW-HH-MN-DS-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID of which you want to change the setting.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'1'-'2'(31h, 32h): Message length

Message
  STX (02h): Start of Message
  'C'-'2'-'1'-'2'  (43h, 32h, 31h, 32h): Date & Time write command
  'YY'-'MM'-'DD'-'WW'-'HH'-'MN'-'DS': Date & Time data
       YY: Year (offset 2000)
           '0'-'0'(30h, 30h): 2000
              |
           '6'-'3'(36h, 33h): 2099 (99 = 63h)

       MM: Month
            '0'-'1'(30h, 31h): January
              |
            '0'-'C'(30h, 43h): December

       DD: Day
            '0'-'1'(30h, 31h): 1
              |
            '1'-'E'(31h, 45h): 30(=1Eh)
            '1'-'F'(31h, 46h): 31(=1Fh)

       WW: weekdays
            '0'-'0'(30h, 30h): Sunday
            '0'-'1'(30h, 31h): Monday
            '0'-'2'(30h, 32h): Tuesday
            '0'-'3'(30h, 33h): Wednesday
            '0'-'4'(30h, 34h): Thursday
            '0'-'5'(30h, 35h): Friday
            '0'-'6'(30h, 36h): Saturday

       HH: Hours
            '0'-'0'(30h, 30h): 0
              |
            '1'-'7'(31h, 37h): 23 (=17h)

       MN: Minutes
            '0'-'0'(30h, 30h): 0
              |
           '3'-'B' (33h, 42h): 59 (=3Bh)

       DS: Daylight saving (Summer time)
            '0'-'0'(30h, 30h): NO
            '0'-'1'(30h, 31h): YES

  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

2) The monitor replies a data for confirmation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'1'-'6' | STX-'C'-'3'-'1'-'2'-ST-YY-MM-DD-WW-HH-MN-DS-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  '0' (30h): Message receiver is the controller.
  Monitor ID: Indicate a replying Monitor ID.
              Ex.)  When this byte is set to 'A', the replying Monitor ID is '1'.
  'B' (42h): Message type is "Command reply".
  '1'-'6'(31h, 36h): Message length

Message
  STX (02h): Start of Message
  'C'-'3'-'1'-'2' (43h, 33h, 31h, 32h): Date & Time write reply command

```
  ST: Date & Time Status command
        '0'-'0'(30h, 30h): No error
        '0'-'1'(30h, 31h): Error
  'YY'-'MM'-'DD'-'WW'-'HH'-'MN'-'DS': Date & Time data
        YY: Year (offset 2000)
           '0'-'0'(30h, 30h): 2000
              |
           '6'-'3'(36h, 33h): 2099 (99 = 63h)

        MM: Month
             '0'-'1'(30h, 31h): January
               |
             '0'-'C'(30h, 43h): December

        DD: Day
             '0'-'1'(30h, 31h): 1
               |
             '1'-'E'(31h, 45h): 30(=1Eh)
             '1'-'F'(31h, 46h): 31(=1Fh)

        WW: weekdays
             '0'-'0'(30h, 30h): Sunday
             '0'-'1'(30h, 31h): Monday
             '0'-'2'(30h, 32h): Tuesday
             '0'-'3'(30h, 33h): Wednesday
             '0'-'4'(30h, 34h): Thursday
             '0'-'5'(30h, 35h): Friday
             '0'-'6'(30h, 36h): Saturday

        HH: Hours
             '0'-'0'(30h, 30h): 0
               |
             '1'-'7'(31h, 37h): 23 (=17h)

        MN: Minutes
             '0'-'0'(30h, 30h): 0
               |
             '3'-'B' (33h, 42h): 59 (=3Bh)

        DS: Daylight saving (Summer time)
             '0'-'0'(30h, 30h): NO
             '0'-'1'(30h, 31h): YES

  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet
```

# 10. Schedule read and write

## 10.1 Schedule Read

This command is used in order to read the setting of the Schedule.

1) The controller requests the monitor to read Schedule.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'8' | STX-'C'-'2'-'2'-'1'-PG-ETX | BCC | CR |

```
Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID of which you want to get status.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'A' (41h): Message type is "Command".
```

'0'-'8'(30h, 38h): Message length

Message
STX (02h): Start of Message
'C'-'2'-'2'-'1' (43h, 32h, 32h, 31h): Schedule read request command.
PG: Program No.
- The data must be ASCII characters strings.

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies Schedule to the controller.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'2'-'6' | STX-'C'-'3'-'2'-'1'-PG-ON HOUR-ON MIN-OFF HOUR-OFF MIN-INPUT-WD-FL-P MODE-EXT1-EXT2-EXT3-EXT4-EXT5-EXT6-EXT7-ETX | BCC | CR |

Header
SOH (01h): Start of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'2'-'6'(32h, 36h): Message length

Message
STX (02h): Start of Message
'C'-'3'-'2'-'1' (43h, 33h, 32h, 31h): Schedule read reply command
PG-ON HOURS-ON MIN-OFF HOURS-OFF MIN-INPUT-WD-FL-P MODE-
EXT1-EXT2-EXT3-EXT4-EXT5-EXT6-EXT7: Schedule data
PG: Program No.
'0'-'0'(30h, 30h): Program No.1
|
'0'-'6'(30h, 36h): Program No.7

ON_HOUR: Turn on time (hour)
'0'-'0'(30h, 30h): 00
|
'1'-'7'(31h, 37h): 23 (=17h)
'1'-'8'(31h, 38h): ON timer isn't set.

ON_MIN: Turn on time (minute)
'0'-'0'(30h, 30h): 0
|
'3'-'B'(33h, 42h): 59
'3'-'C'(33h, 43h): On timer isn't set.

OFF_HOUR: Turn off time (hour)
'0'-'0'(30h, 30h): 00
|
'1'-'7'(31h, 37h): 23 (=17h)
'1'-'8'(31h, 38h): Off timer isn't set.

OFF_MIN: Turn off time (minute)
'0'-'0'(30h, 30h): 0
|
'3'-'B'(33h, 42h): 59 (=3Bh)
'3'-'C'(33h, 43h): Off timer isn't set.

INPUT: Timer input
'0'-'0'(30h,30h): No mean (works on last memory)

'0'-'1'(30h,31h): VGA
'0'-'2'(30h,32h): RGB/HV
'0'-'3'(30h,33h): DVI
'0'-'5'(30h,35h): Video1
'0'-'6'(30h,36h): Video2
'0'-'7'(30h,37h): S-Video
'0'-'A'(30h,41h): TV
'0'-'C'(30h,43h): DVD/HD1
'0'-'D'(30h,44h): Option
'0'-'E'(30h,45h): DVD/HD2
'0'-'F'(30h,46h): Display Port
'1'-'1'(31h,31h): HDMI

WD: Week setting
bit 0: Monday
bit 1: Tuesday
bit 2: Wednesday
bit 3: Thursday
bit 4: Friday
bit 5: Saturday
bit 6: Sunday

EX.
'0'-'1'(30h, 31h): Monday
'0'-'4'(30h, 34h): Wednesday
'0'-'F'(30h, 46h): Monday, Tuesday, Wednesday and Thursday
'7'-'F'(37h, 46h): Monday to Sunday

FL: Option
bit 0: 0:once 1:Everyday
bit 1: 0:once 1:Every week
bit 2: 0:Disable 1:Enable

EX.
'0'-'1'(30h, 31h): Disable, Everyday
'0'-'4'(30h, 34h): Enable, once

P MODE: Picture mode
'0'-'0'(30h,30h): No mean (works on last memory)
'0'-'1'(30h,31h): sRGB
'0'-'3'(30h,33h): Hi-Bright
'0'-'4'(30h,34h): Standard
'0'-'5'(30h,34h): Cinema
'0'-'6'(30h,36h): ISF-Day
'0'-'7'(30h,37h): ISF-Night
'0'-'B'(30h,42h): Ambient-1
'0'-'C'(30h,43h): Ambient-2

EXT1: Extension1
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT2: Extension 2
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT3: Extension 3
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT4: Extension 4
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT5: Extension 5
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT6: Extension 6
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT7: Extension 7
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

 Delimiter
  CR (0Dh): End of packet

***Following command also can be used for to keep backward compatibility, in order to read the setting of the Schedule.

1) The controller requests the monitor to read Schedule.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'8' | STX-'C'-'2'-'1'-'3'-PG-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID of which you want to get status.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'A' (41h): Message type is "Command".
  '0'-'8'(30h, 38h): Message length

Message
  STX (02h): Start of Message
  'C'-'2'-'1'-'3' (43h, 32h, 31h, 33h): Schedule read request command.
  PG: Program No.
      ➢ The data must be ASCII characters strings.
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

2) The monitor replies Schedule to the controller.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'1'-'6' | STX-'C'-'3'-'1'-'3'-PG-ON HOUR-ON MIN-OFF HOUR-OFF MIN-INPUT-WD-FL-ETX | BCC | CR |

Header
  SOH (01h): Start of Header
  '0' (30h): Reserved
  '0' (30h): Message receiver is the controller.
  Monitor ID: Indicate a replying Monitor ID.
              Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
  'B' (42h): Message type is "Command reply".
  '1'-'6'(31h, 36h): Message length

Message
  STX (02h): Start of Message
  'C'-'3'-'1'-'3'  (43h, 33h, 31h, 33h): Schedule read reply command
  PG-ON HOURS-ON MIN-OFF HOURS-OFF MIN-INPUT-WD-FL: Schedule data
        PG: Program No.
            '0'-'0'(30h, 30h): Program No.1
              |
            '0'-'6'(30h, 36h): Program No.7

        ON_HOUR: Turn on time (hour)

```
            '0'-'0'(30h, 30h): 00
              |
            '1'-'7'(31h, 37h): 23 (=17h)
            '1'-'8'(31h, 38h): ON timer isn't set.

        ON_MIN:  Turn on time (minute)
            '0'-'0'(30h, 30h): 0
              |
            '3'-'B'(33h, 42h): 59
            '3'-'C'(33h, 43h): On timer isn't set.

        OFF_HOUR: Turn off time (hour)
            '0'-'0'(30h, 30h): 00
              |
            '1'-'7'(31h, 37h): 23 (=17h)
            '1'-'8'(31h, 38h): Off timer isn't set.

        OFF_MIN:  Turn off time (minute)
            '0'-'0'(30h, 30h): 0
              |
            '3'-'B'(33h, 42h): 59 (=3Bh)
            '3'-'C'(33h, 43h): Off timer isn’t set.

        INPUT: Timer input
            '0'-'0'(30h, 30h): DVI
            '0'-'1'(30h, 31h): VGA
            '0'-'2'(30h, 32h): RGB/HV
            '0'-'3'(30h, 33h): DVD/HD1
            '0'-'4'(30h, 34h): VIDEO
            '0'-'5'(30h, 35h): S-VIDEO
            '0'-'7'(30h,30h): No mean (Works on last memory)


        WD: Week setting
            bit 0: Monday
            bit 1: Tuesday
            bit 2: Wednesday
            bit 3: Thursday
            bit 4: Friday
            bit 5: Saturday
            bit 6: Sunday

            EX.
            '0'-'1'(30h, 31h): Monday
            '0'-'4'(30h, 34h): Wednesday
            '0'-'F'(30h, 46h): Monday, Tuesday, Wednesday and Thursday
            '7'-'F'(37h, 46h): Monday to Sunday

        FL: Option
            bit 0: 0:once 1:Everyday
            bit 1: 0:once 1:Every week
            bit 2: 0:Disable 1:Enable

            EX.
            '0'-'1'(30h, 31h): Disable, Everyday
            '0'-'4'(30h, 34h): Enable, once

  ETX (03h): End of Message

 Check code
  BCC: Block Check Code
       Refer to the section 4.5 “Check code” for a BCC calculation.

 Delimiter
  CR (0Dh): End of packet
```

## 10.2 Schedule Write

This command is used in order to write the setting of the Schedule.

1) The controller requests the monitor to write Schedule.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'2'-'6' | STX-'C'-'2'-'2'-'2'-PG-ON HOUR-ON MIN-OFF HOUR-OFF MIN-INPUT-WD-FL-P MODE-EXT1-EXT2-EXT3-EXT4-EXT5-EXT6-EXT7-ETX | BCC | CR |

```
Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID of which you want to change a setting.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'A' (41h): Message type is "Command".
  '2'-'6'(32h, 36h): Message length.

Message
  STX (02h): Start of Message
  'C'-'2'-'2'-'2'  (43h, 32h, 32h, 32h): Schedule writes command
  PG-ON HOURS-ON MIN-OFF HOURS-OFF MIN-INPUT-WD-FL-P MODE
  EXT1-EXT2-EXT3-EXT4-EXT5-EXT6-EXT7: Schedule data
        PG: Program No.
            '0'-'0'(30h, 30h): Program No.1
              |
            '0'-'6'(30h, 36h): Program No.7

        ON_HOUR: Turn on time (hour)
            '0'-'0'(30h, 30h): 00
              |
            '1'-'7'(31h, 37h): 23 (=17h)
            '1'-'8'(31h, 38h): ON timer isn't set.

        ON_MIN:  Turn on time (minute)
            '0'-'0'(30h, 30h): 0
              |
            '3'-'B'(33h, 42h): 59
            '3'-'C'(33h, 43h): On timer isn’t set.

        OFF_HOUR: Turn off time (hour)
            '0'-'0'(30h, 30h): 00
              |
            '1'-'7'(31h, 37h): 23 (=17h)
            '1'-'8'(31h, 38h): Off timer isn't set.

        OFF_MIN:  Turn off time (minute)
            '0'-'0'(30h, 30h): 0
              |
            '3'-'B'(33h, 42h): 59 (=3Bh)
            '3'-'C'(33h, 43h): Off timer isn’t set.

        INPUT: Timer input
            '0'-'0'(30h,30h): No mean (works on last memory)
            '0'-'1'(30h,31h): VGA
            '0'-'2'(30h,32h): RGB/HV
            '0'-'3'(30h,33h): DVI
            '0'-'4'(30h,34h): HDMI (Set only)
            '0'-'5'(30h,35h): Video1
            '0'-'6'(30h,36h): Video2
            '0'-'7'(30h,37h): S-Video
            '0'-'A'(30h,41h): TV
            '0'-'C'(30h,43h): DVD/HD1
            '0'-'D'(30h,44h): Option
            '0'-'E'(30h,45h): DVD/HD2
            '0'-'F'(30h,46h): Display Port
            '1'-'1'(31h,31h): HDMI
            * Please select active input on your system (setting).
            * If you select inactive input here, the input change execution will be ignored.
```

```
        WD: Week setting
             bit 0: Monday
             bit 1: Tuesday
             bit 2: Wednesday
             bit 3: Thursday
             bit 4: Friday
             bit 5: Saturday
             bit 6: Sunday

             EX.
             '0'-'1'(30h, 31h): Monday
             '0'-'4'(30h, 34h): Wednesday
             '0'-'F'(30h, 46h): Monday, Tuesday, Wednesday and Thursday
             '7'-'F'(37h, 46h): Monday to Sunday

         FL: Option
             bit 0: 0:once 1:Everyday
             bit 1: 0:once 1:Every week
             bit 2: 0:Disable 1:Enable
              * When bit 0 and bit 1 are '1', it behaves as Everyday.

             EX.
             '0'-'1'(30h, 31h): Disable, Everyday
             '0'-'4'(30h, 34h): Enable, once

        P MODE: Picture mode
             '0'-'0'(30h,30h): No mean (Works on last memory)
             '0'-'1'(30h,31h): sRGB
             '0'-'3'(30h,33h): Hi-Bright
             '0'-'4'(30h,34h): Standard
             '0'-'5'(30h,34h): Cinema
             '0'-'6'(30h,36h): ISF-Day
             '0'-'7'(30h,37h): ISF-Night
             '0'-'B'(30h,42h): Ambient-1
             '0'-'C'(30h,43h): Ambient-2
             * Please select active picture mode on your system (setting).
             * If you select inactive picture mode here, the input change execution will be ignored.

        EXT1: Extension1
             '0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

        EXT2: Extension 2
             '0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

        EXT3: Extension 3
             '0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

        EXT4: Extension 4
             '0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

        EXT5: Extension 5
             '0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

        EXT6: Extension 6
             '0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

        EXT7: Extension 7
             '0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 “Check code” for a BCC calculation.

Delimiter
  CR (0Dh): End of packet
```

2) The monitor replies a data for confirmation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'2'-'8' | STX-'C'-'3'-'2'-'2'-ST-PG-ON HOUR-ON MIN-OFF HOUR-OFF MIN-INPUT-WD-FL-P MODE-EXT1-EXT2-EXT3-EXT4-EXT5-EXT6-EXT7-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'2'-'8'(32h, 38h): Message length

Message
STX (02h): Start of Message
'C'-'3'-'2'-'2' (43h, 33h, 32h, 32h): Schedule writes reply command
ST: Schedule Status command
'0'-'0'(30h, 30h): No error
'0'-'1'(30h, 31h): Error
PG-ON HOURS-ON MIN-OFF HOURS-OFF MIN-INPUT-WD-FL-P MODE
EXT1-EXT2-EXT3-EXT4-EXT5-EXT6-EXT7: Schedule data
PG: Program No.
'0'-'0'(30h, 30h): Program No.1
|
'0'-'6'(30h, 36h): Program No.7

ON_HOUR: Turn on time (hour)
'0'-'0'(30h, 30h): 00
|
'1'-'7'(31h, 37h): 23 (=17h)
'1'-'8'(31h, 38h): ON timer isn't set.

ON_MIN: Turn on time (minute)
'0'-'0'(30h, 30h): 0
|
'3'-'B'(33h, 42h): 59
'3'-'C'(33h, 43h): On timer isn’t set.

OFF_HOUR: Turn off time (hour)
'0'-'0'(30h, 30h): 00
|
'1'-'7'(31h, 37h): 23 (=17h)
'1'-'8'(31h, 38h): Off timer isn't set.

OFF_MIN: Turn off time (minute)
'0'-'0'(30h, 30h): 0
|
'3'-'B'(33h, 42h): 59 (=3Bh)
'3'-'C'(33h, 43h): Off timer isn’t set.

INPUT: Timer input
'0'-'0'(30h,30h): No mean (works on last memory)
'0'-'1'(30h,31h): VGA
'0'-'2'(30h,32h): RGB/HV
'0'-'3'(30h,33h): DVI
'0'-'5'(30h,35h): Video1
'0'-'6'(30h,36h): Video2
'0'-'7'(30h,37h): S-Video
'0'-'A'(30h,41h): TV
'0'-'C'(30h,43h): DVD/HD1
'0'-'D'(30h,44h): Option
'0'-'E'(30h,45h): DVD/HD2
'0'-'F'(30h,46h): Display Port
'1'-'1'(31h,31h): HDMI

WD: Week setting
bit 0: Monday

bit 1: Tuesday
bit 2: Wednesday
bit 3: Thursday
bit 4: Friday
bit 5: Saturday
bit 6: Sunday

EX.
'0'-'1'(30h, 31h): Monday
'0'-'4'(30h, 34h): Wednesday
'0'-'F'(30h, 46h): Monday, Tuesday, Wednesday and Thursday
'7'-'F'(37h, 46h): Monday to Sunday

FL: Option
bit 0: 0:once 1:Everyday
bit 1: 0:once 1:Every week
bit 2: 0:Disable 1:Enable
* When bit 0 and bit 1 are '1', it behaves as Everyday.

EX.
'0'-'1'(30h, 31h): Disable, Everyday
'0'-'4'(30h, 34h): Enable, once

P MODE: Picture mode
'0'-'0'(30h,30h): No mean (works on last memory)
'0'-'1'(30h,31h): sRGB
'0'-'3'(30h,33h): Hi-Bright
'0'-'4'(30h,34h): Standard
'0'-'5'(30h,34h): Cinema
'0'-'6'(30h,36h): ISF-Day
'0'-'7'(30h,37h): ISF-Night
'0'-'B'(30h,42h): Ambient-1
'0'-'C'(30h,43h): Ambient-2

EXT1: Extension1
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT2: Extension 2
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT3: Extension 3
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT4: Extension 4
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT5: Extension 5
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT6: Extension 6
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

EXT7: Extension 7
'0'-'0'(30h,30h): (On this monitor, it is always ‘00’)

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 “Check code” for a BCC calculation.

Delimiter
CR (0Dh): End of packet

3) The controller requests the monitor to write Enable/Disable Schedule.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'A' | STX-'C'-'2'-'1'-'5'-PG-EN-ETX | BCC | CR |

Header

SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID of which you want to change a setting.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-'A'(30h, 41h): Message length

Message
STX (02h): Start of Message
'C'-'2'-'1'-'5' (43h, 32h, 31h, 35h): Enable/Disable Schedule writes command
PG-EN: Enable/Disable Schedule data
PG: Program No.
'0'-'0'(30h, 30h): Program No.1
|
'0'-'6'(30h, 36h): Program No.7

EN: Enable /Disable
'0'-'0'(30h, 30h): Disable
'0'-'1'(30h, 31h): Enable

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

4) The monitor replies a data for confirmation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'0'-'C' | STX-'C'-'3'-'1'-'5'-ST-PG-EN-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'0'-'C' (30h, 43h): Message length

Message
STX (02h): Start of Message
'C'-'3'-'1'-'5' (43h, 33h, 31h, 35h): Enable/Disable Schedule writes reply command
ST: Enable/Disable Schedule Status command
'0'-'0'(30h, 30h): No error
'0'-'1'(30h, 31h): Error
PG-EN: Enable/Disable Schedule data
PG: Program No.
'0'-'0'(30h, 30h): Program No.1
|
'0'-'6'(30h, 36h): Program No.7

EN: Enable /Disable
'0'-'0'(30h, 30h): Disable
'0'-'1'(30h, 31h): Enable

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

***Following command also can be used for to keep backward compatibility, in order to write the setting of the Schedule.

1) The controller requests the monitor to write Schedule.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'1'-'6' | STX-'C'-'2'-'1'-'4'-PG-ON HOUR-ON MIN-OFF HOUR-OFF MIN-INPUT-WD-FL-ETX | BCC | CR |

```
Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID of which you want to change a setting.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'A' (41h): Message type is "Command".
  '1'-'6'(31h, 36h): Message length.

Message
  STX (02h): Start of Message
  'C'-'2'-'1'-'4'  (43h, 32h, 31h, 34h): Schedule writes command
  PG-ON HOURS-ON MIN-OFF HOURS-OFF MIN-INPUT-WD-FL: Schedule data
        PG: Program No.
            '0'-'0'(30h, 30h): Program No.1
              |
            '0'-'6'(30h, 36h): Program No.7

        ON_HOUR: Turn on time (hour)
            '0'-'0'(30h, 30h): 00
              |
            '1'-'7'(31h, 37h): 23 (=17h)
            '1'-'8'(31h, 38h): ON timer isn't set.

        ON_MIN:  Turn on time (minute)
            '0'-'0'(30h, 30h): 0
              |
            '3'-'B'(33h, 42h): 59
            '3'-'C'(33h, 43h): On timer isn’t set.

        OFF_HOUR: Turn off time (hour)
            '0'-'0'(30h, 30h): 00
              |
            '1'-'7'(31h, 37h): 23 (=17h)
            '1'-'8'(31h, 38h): Off timer isn't set.

        OFF_MIN:  Turn off time (minute)
            '0'-'0'(30h, 30h): 0
              |
            '3'-'B'(33h, 42h): 59 (=3Bh)
            '3'-'C'(33h, 43h): Off timer isn’t set.

        INPUT: Timer input
            '0'-'0'(30h, 30h): DVI
            '0'-'1'(30h, 31h): VGA
            '0'-'2'(30h, 32h): RGB/HV
            '0'-'3'(30h, 33h): DVD/HD1
            '0'-'4'(30h, 34h): VIDEO
            '0'-'5'(30h, 35h): S-VIDEO
            '0'-'7'(30h, 37h): (Works on last memory)
            * Please select active input on your system (setting).
            * If you select inactive input here, the input change execution will be ignored.

        WD: Week setting
            bit 0: Monday
            bit 1: Tuesday
            bit 2: Wednesday
            bit 3: Thursday
```

bit 4: Friday
bit 5: Saturday
bit 6: Sunday

EX.
'0'-'1'(30h, 31h): Monday
'0'-'4'(30h, 34h): Wednesday
'0'-'F'(30h, 46h): Monday, Tuesday, Wednesday and Thursday
'7'-'F'(37h, 46h): Monday to Sunday

FL: Option
bit 0: 0:once 1:Everyday
bit 1: 0:once 1:Every week
bit 2: 0:Disable 1:Enable
* When bit 0 and bit 1 are '1', it behaves as Everyday.

EX.
'0'-'1'(30h, 31h): Disable, Everyday
'0'-'4'(30h, 34h): Enable, once

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies a data for confirmation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'1'-'8' | STX-'C'-'3'-'1'-'4'-ST-PG-ON HOUR-ON MIN-OFF HOUR-OFF MIN-INPUT-WD-FL-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'1'-'8'(31h, 38h): Message length

Message
STX (02h): Start of Message
'C'-'3'-'1'-'4' (43h, 33h, 31h, 34h): Schedule writes reply command
ST: Schedule Status command
'0'-'0'(30h, 30h): No error
'0'-'1'(30h, 31h): Error
PG-ON HOURS-ON MIN-OFF HOURS-OFF MIN-INPUT-WD-FL: Schedule data
PG: Program No.
'0'-'0'(30h, 30h): Program No.1
|
'0'-'6'(30h, 36h): Program No.7

ON_HOUR: Turn on time (hour)
'0'-'0'(30h, 30h): 00
|
'1'-'7'(31h, 37h): 23 (=17h)
'1'-'8'(31h, 38h): ON timer isn't set.

ON_MIN: Turn on time (minute)
'0'-'0'(30h, 30h): 0
|
'3'-'B'(33h, 42h): 59
'3'-'C'(33h, 43h): On timer isn't set.

OFF_HOUR: Turn off time (hour)
'0'-'0'(30h, 30h): 00

```
                |
            '1'-'7'(31h, 37h): 23 (=17h)
            '1'-'8'(31h, 38h): Off timer isn't set.

        OFF_MIN:  Turn off time (minute)
            '0'-'0'(30h, 30h): 0
                |
            '3'-'B'(33h, 42h): 59 (=3Bh)
            '3'-'C'(33h, 43h): Off timer isn't set.

        INPUT: Timer input
            '0'-'0'(30h, 30h): DVI
            '0'-'1'(30h, 31h): VGA
            '0'-'2'(30h, 32h): RGB/HV
            '0'-'3'(30h, 33h): DVD/HD1
            '0'-'4'(30h, 34h): VIDEO
            '0'-'5'(30h, 35h): S-VIDEO
            '0'-'7'(30h,30h): No mean (Works on last memory)

        WD: Week setting
            bit 0: Monday
            bit 1: Tuesday
            bit 2: Wednesday
            bit 3: Thursday
            bit 4: Friday
            bit 5: Saturday
            bit 6: Sunday

            EX.
            '0'-'1'(30h, 31h): Monday
            '0'-'4'(30h, 34h): Wednesday
            '0'-'F'(30h, 46h): Monday, Tuesday, Wednesday and Thursday
            '7'-'F'(37h, 46h): Monday to Sunday

        FL: Option
            bit 0: 0:once 1:Everyday
            bit 1: 0:once 1:Every week
            bit 2: 0:Disable 1:Enable
            * When bit 0 and bit 1 are '1', it behaves as Everyday.

            EX.
            '0'-'1'(30h, 31h): Disable, Everyday
            '0'-'4'(30h, 34h): Enable, once

  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet
```

3) The controller requests the monitor to write Enable/Disable Schedule.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'A' | STX-'C'-'2'-'1'-'5'-PG-EN-ETX | BCC | CR |

```
Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID of which you want to change a setting.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'A' (41h): Message type is "Command".
  '0'-'A'(30h, 41h): Message length

Message
  STX (02h): Start of Message
  'C'-'2'-'1'-'5' (43h, 32h, 31h, 35h): Enable/Disable Schedule writes command
```

PG-EN: Enable/Disable Schedule data
PG: Program No.
'0'-'0'(30h, 30h): Program No.1
|
'0'-'6'(30h, 36h): Program No.7

EN: Enable /Disable
'0'-'0'(30h, 30h): Disable
'0'-'1'(30h, 31h): Enable

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

4) The monitor replies a data for confirmation.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'0'-'C' | STX-'C'-'3'-'1'-'5'-ST-PG-EN-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
'0'-'C' (30h, 43h): Message length

Message
STX (02h): Start of Message
'C'-'3'-'1'-'5' (43h, 33h, 31h, 35h): Enable/Disable Schedule writes reply command
ST: Enable/Disable Schedule Status command
'0'-'0'(30h, 30h): No error
'0'-'1'(30h, 31h): Error
PG-EN: Enable/Disable Schedule data
PG: Program No.
'0'-'0'(30h, 30h): Program No.1
|
'0'-'6'(30h, 36h): Program No.7

EN: Enable /Disable
'0'-'0'(30h, 30h): Disable
'0'-'1'(30h, 31h): Enable

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

# 11. Self diagnosis

## 11.1 Self-diagnosis status read

This command is used in order to read the Self-diagnosis status.

1) The controller requests the monitor to read Self-diagnosis status.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'4' | STX-'B'-'1'-ETX | BCC | CR |

Header

SOH (01h): Start of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID which you want to get status.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-'4'(30h, 34h): Message length

Message
STX (02h): Start of Message
'B'-'1' (42h, 31h): Self-diagnosis command
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies a result of the self-diagnosis.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-N-N | STX-'A'-'1'-<br>ST(0)-ST(1) --------ST(n)-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
N-N: Message length
Note.) The maximum data length that can be written to the monitor at a time is 32bytes.
Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (34h and 30h).

Message
STX (02h): Start of Message
'A'-'1' (41h, 31h): Application Test Report reply command
ST: Result of self-tests
'0'-'0'(30h, 30h):00: Normal
'7'-'0'(37h, 30h):70: Standby-power +3.3V abnormality
'7'-'1'(37h, 31h):71: Standby-power +5V abnormality
'7'-'2'(37h, 32h):72: Panel-power +12V abnormality
'7'-'3'(37h, 33h):73: Main-power +2.5V abnormality
'7'-'4'(37h, 34h):74: Main-power +1.8V abnormality
'7'-'5'(37h, 35h):75: Main-power +5V abnormality
'7'-'6'(37h, 36h):76: Sub-power +3.3V abnormality
'7'-'7'(37h, 37h):77: Main-power +3.3V abnormality
'8'-'0'(38h, 30h):80: Cooling fan-1 abnormality
'8'-'1'(38h, 31h):81: Cooling fan-2 abnormality
('8'-'2'(38h, 32h):82: Cooling fan-3 abnormality)
'9'-'0'(39h, 30h):90: Inverter abnormality
'A'-'0'(41h, 30h):A0: Temperature abnormality – shutdown
'A'-'1'(41h, 31h):A1: Temperature abnormality – half brightness

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

# 12. Serial No. & Model Name Read

## 12.1 Serial No. Read

This command is used in order to read a serial number.

1) The controller requests the monitor to read a serial number.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'6' | STX-'C'-'2'-'1'-'6'-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
Monitor ID: Specify the Monitor ID which you want to get serial number.
Ex.) If Monitor ID is '1', specify 'A'.
'0' (30h): Message sender is the controller.
'A' (41h): Message type is "Command".
'0'-'6'(30h, 36h): Message length

Message
STX (02h): Start of Message
'C'-'2'-'1'-'6' (43h, 32h, 31h, 36h): Serial No. command
ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

2) The monitor replies the serial No. data to the controller.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-N-N | STX-'C'-'3'-'1'-'6'-<br>Data(0)-Data(1)---Data(n)-ETX | BCC | CR |

Header
SOH (01h): Start Of Header
'0' (30h): Reserved
'0' (30h): Message receiver is the controller.
Monitor ID: Indicate a replying Monitor ID.
Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
'B' (42h): Message type is "Command reply".
N-N: Message length
Note.) The maximum data length that can be returned from the monitor at a time is 32bytes.
Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

Message
STX (02h): Start of Message
'C'-'3'-'1'-'6' (41h, 33h, 31h, 36h): Serial No. reply command
Data(0)-Data(1)----Data(n):Serial Number
- These data are encoded to ASCII characters strings.

ETX (03h): End of Message

Check code
BCC: Block Check Code
Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
CR (0Dh): End of packet

## 12.2 Model Name Read

This command is used in order to read the Model Name.

1) The controller requests the monitor to read Model Name.

| Header | Message | Check code | Delimiter |
|---|---|---|---|

| | | | |
|---|---|---|---|
| SOH-'0'-Monitor ID-'0'-'A'-'0'-'6' | STX-'C'-'2'-'1'-'7'-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID which you want to get Model Name.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'A' (41h): Message type is "Command".
  '0'-'6'(30h, 36h): Message length

Message
  STX (02h): Start of Message
    'C'-'2'-'1'-'7' (43h, 32h, 31h, 37h): Model Name command
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

2) The monitor replies the model name data to the controller.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-N-N | STX-'C'-'3'-'1'-'7'-Data(0) -Data(1)—---<br>-Data(n)-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  '0' (30h): Message receiver is the controller.
  Monitor ID: Indicate a replying Monitor ID.
              Ex.) When this byte is set to 'A', the replying Monitor ID is '1'.
  'B' (42h): Message type is "Command reply".
  N-N: Message length
              Note.) The maximum data length that can be returned from the monitor at a time is
                     32bytes.
              Ex.) The byte data 20h is encoded as ASCII characters '2' and '0' (32h and 30h).

Message
  STX (02h): Start of Message
  'C'-'3'-'1'-'7' (43h, 33h, 31h, 37h): Model Name reply Command
  Data(0) -Data(1)----Data(n):Model name
    ➢ These data are encoded to ASCII characters strings.
  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

# 13. Security Lock

## 13.1 Security Lock Control

This command sets the condition of security lock function to "LOCK" or "UNLOCK".

If security pass codes 1st to 4th are matched with monitor resisted pass codes, then this command is executed, and reply no error status and a new condition.
If codes aren't matched with them then setting isn't changed, and reply error status and a current condition.
If the monitor receives this command while waiting for Pass codes inputs, then it only checks Pass cords (and releases image muting if Pass codes are OK) and doesn't apply "EN" parameter.

1) The controller requests the monitor to set the condition of security lock.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-MonitorID-'0'-'A'-'1'-'0' | STX-'C'-'2'-'1'-'D'-EN-P1-P2-P3-P4-ETX | BCC | CR |

Header
  SOH (01h): Start Of Header
  '0' (30h): Reserved
  Monitor ID: Specify the Monitor ID of which you want to change a setting.
              Ex.) If Monitor ID is '1', specify 'A'.
  '0' (30h): Message sender is the controller.
  'A' (41h): Message type is "Command".
  '1'-'0'(31h, 30h): Message length

Message
  STX (02h): Start of Message
  'C'-'2'-'1'-'D'  (43h, 32h, 31h, 44h): Security Lock Control command
  EN-P1-P2-P3-P4: Lock condition control data
        EN: Enable /Disable
             '0'-'0'(30h, 30h): Disable
             '0'-'1'(30h, 31h): Enable

        P1: Security Pass code 1st
             '0'-'0'(30h, 30h): "0"
                |
             '0'-'9'(30h, 39h): "9"

        P2: Security Pass code 2nd
             '0'-'0'(30h, 30h): "0"
                |
             '0'-'9'(30h, 39h): "9"

        P3: Security Pass code 3rd
             '0'-'0'(30h, 30h): "0"
                |
             '0'-'9'(30h, 39h): "9"

        P4: Security Pass code 4th
             '0'-'0'(30h, 30h): "0"
                |
             '0'-'9'(30h, 39h): "9"

  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 “Check code” for a BCC calculation.

Delimiter
  CR (0Dh): End of packet

2) The monitor replies the result to the controller.

| Header | Message | Check code | Delimiter |
|---|---|---|---|
| SOH-'0'-'0'-Monitor ID-'B'-'0'-'A' | STX-'C'-'3'-'1'-'D'-ST-EN-ETX | BCC | CR |

Header
  SOH (01h): Start of Header
  '0' (30h): Reserved
  '0' (30h): Message receiver is the controller.
  Monitor ID: Indicate a replying Monitor ID.
              Ex.)  When this byte is set to 'A', the replying Monitor ID is '1'.
  'B' (42h): Message type is "Command reply".
  '0'-'A'(30h, 41h): Message length

Message
  STX (02h): Start of Message

```
  'C'-'3'-'1'-'D'  (43h, 33h, 31h, 44h): Security Lock Control reply command
  ST-EN: Lock condition result data
        ST: Status
             '0'-'0'(30h, 30h): No error
             '0'-'1'(30h, 31h): Error

        EN: Enable /Disable (Current condition)
             '0'-'0'(30h, 30h): Disable
             '0'-'1'(30h, 31h): Enable

  ETX (03h): End of Message

Check code
  BCC: Block Check Code
       Refer to the section 4.5 "Check code" for a BCC calculation.

Delimiter
  CR (0Dh): End of packet
```

# Appendix

## A. Operation Code (OP code) Table

| | Item | | OP code page | OP code | Parameter | Remarks |
|---|---|---|---|---|---|---|
| PICTURE | Brightness | | 00h | 10h | 0: dark<br>\|<br>100(64h): bright | |
| | Contrast | | 00h | 12h | 0: low<br>\|<br>100(64h): high | |
| | Sharpness | | 00h | 8Ch | 0: dull<br>\|<br>82(52h): sharp | |
| | Black Level | | 00h | 92h | 0: dark<br>\|<br>63(3Fh): bright | |
| | Tint | | 00h | 90h | 0: purplish<br>\|<br>63(3Fh): greenish | |
| | Color | | 02h | 1Fh | 0: pale<br>\|<br>63(3Fh): deep | |
| | Color Temperature | | 00h | 54h | 0:2600K<br>\|<br>74(4Ah):10000K | 100K/step<br><br>X461HB's minimum is 4(04h):3000K |
| | Color control | | 00h | Red: 9Bh<br>Yellow: 9Ch<br>Green: 9Dh<br>Cyan: 9Eh<br>Blue: 9Fh<br>Magenta: A0h | 0:<br>\|<br>50(32h):(center)<br>\|<br>100(64h): | |
| | | | | Saturation: 8Ah | 0: pale<br>\|<br>10(0Ah): deep | |
| | Gamma Selection | | 02h | 68h | Gamma<br>Table Selection<br>1: Native Gamma<br>4: Gamma=2.2<br>8: Gamma=2.4<br>7: S Gamma<br>5: DICOM SIM.<br>6: Programmable | |
| | Movie Settings | Adaptive Contrast | 02h | 8Dh | 0: None<br>1: Off<br>2: Low<br>3: Middle<br>4: High | |
| | | Noise Reduction | 02h | 20h | 0: Off<br>\|<br>16(10h) : High | |
| | | Film Mode | 02h | 23h | 1: Off<br>2: Auto | |
| | Picture mode | | 02h | 1Ah | 1: sRGB<br>3: Hi-Bright<br>4: Standard<br>5: Cinema<br>6: ISF-Day<br>7: ISF-Night<br>11: Ambient-1<br>12: Ambient-2 | sRGB:<br>PC mode only<br>Cinema:<br>A/V mode only<br><br>ISF-Day:<br>ISF-Night:<br>Each needs an adjustment by ISF. |

| | Item | | OP code page | OP code | Parameter | Remarks |
|---|---|---|---|---|---|---|
| | Ambient | Ambient Brightness Low | 10h | 33h | 0: dark<br>\|<br>100(64h): bright | |
| | | Ambient Brightness High | 10h | 34h | 0: dark<br>\|<br>100(64h): bright | |
| | | Get Current Illuminance | 02h | B4h | 0:<br>\|<br>Max. | Read only |
| | | Bright Sensor Read | 02h | B5h | 0:<br>\|<br>255(FFh) | Read only |
| | Menu tree reset (Picture) | | 02h | CBh | 0: None<br>2: Reset<br>Picture category | Momentary |
| ADJUST | Auto Setup | | 00h | 1Eh | 1: Execute | Momentary |
| | Auto Adjust | | | | N/A | |
| | H Position | | 00h | 20h | 0: Left side<br>\|<br>Max.: Right side | Depends on a display timing |
| | V Position | | 00h | 30h | 0: Bottom side<br>\|<br>Max.: Top side | Depends on a display timing |
| | Clock | | 00h | 0Eh | 0:<br>\|<br>Max. : | |
| | Clock Phase | | 00h | 3Eh | 0:<br>\|<br>Max. : | |
| | H Resolution | | 02h | 50h | 0: Low<br>\|<br>Max. : High | |
| | V Resolution | | 02h | 51h | 0: Low<br>\|<br>Max.: High | |
| | Input Resolution | | 02h | DAh | 1: Auto<br>2: 1024x768<br>3: 1280x768<br>4: 1360x768<br>5: 1366x768<br>6: 1400x1050<br>7: 1680x1050 | |
| | Zoom Mode | Base Zoom | 02h | CEh | 3:16:9-ZOOM<br>4:14:9-ZOOM<br>5:Dynamic<br>1:Off (Real)<br>2:Custom | |
| | | Zoom | 02h | 6Fh | 1:100%<br>2:101%<br>\|<br>201:300% | |
| | | Zoom H-Expansion | 02h | 6Ch | 1:100%<br>2:101%<br>\|<br>201:300% | |
| | | Zoom V-Expansion | 02h | 6Dh | 1:100%<br>2:101%<br>\|<br>201:300% | |
| | | Zoom H-Position | 02h | CCh | 0: Left side<br>\|<br>Max.: Right side | |

| | Item | | OP code page | OP code | Parameter | Remarks |
|---|---|---|---|---|---|---|
| | | Zoom V-Position | 02h | CDh | 0: Down side<br>\|<br>Max.: Up side | |
| | Aspect | | 02h | 70h | 1: Normal<br>2: Full<br>3: Wide<br>4: Zoom<br>5: Trim | Wide:<br>A/V mode only<br>(exc. X431BT)<br>Not available<br>(X431BT)<br><br>Trim:<br>X431BT only |
| | Menu tree reset (Adjust) | | 02h | CBh | 0: None<br>3: Reset<br>Adjust category | Momentary |
| AUDIO | Balance | | 00h | 93h | 0: Left<br>\|<br>50:(Center)<br>\|<br>100: Right | Not available on X461UN. |
| | Treble | | 00h | 8Fh | 0: Min.<br>\|<br>50:(Center)<br>\|<br>100: Max. | Not available on X461UN. |
| | Bass | | 00h | 91h | 0: Min.<br>\|<br>50:(Center)<br>\|<br>100: Max. | Not available on X461UN. |
| | PIP Audio | | | | N/A | |
| | Line out | | | | N/A | |
| | SURROUND | | 02h | 34h | 1: Off<br>2: Low (or On)<br>3: High (or On) | Not available on X461UN. |
| | Audio Input | | 02h | 2Eh | 1: Audio 1(PC)<br>2: Audio 2<br>3: Audio 3<br>4: HDMI<br>6: TV/Option<br>7: Display Port | |
| | Menu tree reset (Audio) | | 02h | CBh | 0: None<br>4: Reset<br>Audio category | Momentary |
| SCHDULE | Off Timer | | 02h | 2Bh | 0: Off<br>1: 1 hour<br>\|<br>24: 24 hours | 1 hour/step |
| | Enable Schedule | | 02h | E5h | 0: No Mean<br>1: No.1 Enable<br>\|<br>7: No.7 Enable | |
| | Disable Schedule | | 02h | E6h | 0: No Mean<br>1: No.1 Disable<br>\|<br>7: No.7 Disable | |
| | Menu tree reset (Schedule) | | 02h | CBh | 0: None<br>5: Reset<br>Schedule category | Momentary |
| P | Keep PIP Mode | | | | N/A | |

| | Item | | OP code page | OP code | Parameter | Remarks |
|---|---|---|---|---|---|---|
| | PIP Mode | | 02h | 72h | 1: Off<br>2: PIP<br>3: POP<br>(4: Still)<br>5: Side by side (aspect)<br>6: Side by side (Full)<br>7: POP aspect Main<br>8: POP aspect Sub | POP:<br>Side by side (aspect): Not available on X431BT<br><br>POP aspect Main: POP aspect Sub: X431BT only |
| | PIP Size | | 02h | 71h | 1: Small<br>2: Middle<br>3: Large | |
| | PIP H Position | | 02h | 74h | 0: left<br>\|<br>100(64h): right | |
| | PIP V Position | | 02h | 75h | 0: top<br>\|<br>100(64h): bottom | |
| | Aspect | | | | N/A | |
| | Text Ticker | Mode | 10h | 08h | 0: None<br>1: Off<br>2: Horizontal<br>3: Vertical | |
| | | Position | 10h | 09h | 0: Top/Left<br>\|<br>100: Bottom/Right | |
| | | Size | 10h | 0Ah | 0-1: Do not set.<br>2: Narrow(2/24)<br>\|<br>8: Wide(8/24) | |
| | | Blend | 10h | 0Bh | 1: 10%<br>\|<br>10: 100% | |
| | | Detect | 10h | 0Ch | 0: None<br>1: Auto<br>2: Off | |
| | | Fade In | 10h | 0Dh | 0: None<br>1: On<br>2: Off | |
| | PIP Input(Sub input) | | 02h | 73h | 0: No mean<br>1: VGA<br>2: RGB/HV<br>3: DVI<br>4: HDMI (Set only)<br>5: Video1<br>6: Video2<br>7: S-Video<br>10: TV<br>12: DVD/HD1<br>13: Option<br>14: DVD/HD2<br>15: Display Port<br>17: HDMI | This operation has limitation of selection. Please refer to the monitor instruction manual. |
| | Menu tree reset (PIP) | | 02h | CBh | 0: None<br>6: Reset<br>PIP category | Momentary |
| OSD | Language | | 00h | 68h | 1: English<br>2: German<br>3: French<br>4: Spanish<br>5: Japanese<br>6: Italian<br>7: Swedish<br>9: Russian | OSD Language |

| | Item | | OP code page | OP code | Parameter | Remarks |
|---|---|---|---|---|---|---|
| | OSD Turn Off | | 00h | FCh | 0-1: Do not set.<br>2: 10s<br>3: 15s<br>\|<br>48: 240s | 5sec/step |
| | OSD Position | H Position | 02h | 38h | 0: Left<br>\|<br>MAX.: Right | |
| | | V Position | 02h | 39h | 0: Down<br>\|<br>MAX.: Up | |
| | Information OSD | | 02h | 3Dh | 0:Disable information OSD<br>3-10:<br>OSD timer [seconds] | |
| | OSD Transparency | | 02h | B8h | 0: None<br>1: Off(Opaque)<br>2: TYPE1<br>3: TYPE2 | |
| | Menu tree reset (OSD) | | 02h | CBh | 0: None<br>7: Reset OSD category | Momentary |
| MULTI DISPLAY | Monitor ID | | 02h | 3Eh | 1-100:ID | |
| | IR Control | | 02h | 3Fh | 1: Normal<br>2: Primary<br>3: Secondary<br>4: Lock (Off) | |
| | Tile Matrix | H monitor | 02h | D0h | 1<br>\|<br>10 | Number of H-division |
| | | V monitor | 02h | D1h | 1<br>\|<br>10 | Number of V-division |
| | | Position | 02h | D2h | 1: Upper left<br>\|<br>MAX.: Lower right | |
| | | Tile comp | 02h | D5h | 1: Disable (Off)<br>2: Enable (On) | |
| | | Mode | 02h | D3h | 1: Disable (Off) and display frame<br>2: Enable (On)<br>3: Disable (Off) and erase frame (Set only) | |
| | Power On Delay | | 02h | D8h | 0: Off (0sec)<br>\|<br>50:50sec | |
| | Power Indicator | | 02h | BEh | 0: None<br>1: On<br>2: Off | |
| | External control | | 10h | 3Eh | 0: No mean<br>1: RS-232C<br>2: LAN | |
| | Setting copy | | | | N/A | |
| | Menu tree reset (Multi Display) | | 02h | CBh | 0: None<br>8: Reset Multi Display category | Momentary |
| DISPLAY PROTECTION | Power Save | | 00h | E1h | 0: Off<br>1: On | |
| | Standby Mode | | 02h | 9Ah | 0: None<br>1: Standby<br>2: ECO Standby | |

| | Item | | OP code page | OP code | Parameter | Remarks |
|---|---|---|---|---|---|---|
| | Fan Control | | 02h | 7Dh | 0: None<br>1: Auto(No offset)<br>2: Forced ON<br>3: Auto(offset -2)<br>4: Auto(offset -4)<br>5: Auto(offset -6)<br>6: Auto(offset -8)<br>7: Auto(offset -10) | Offset affects to a selected sensor. |
| | Fan Speed | | 10h | 3Fh | 0: None<br>1: High<br>2: Low | |
| | Screen Saver | Gamma | 02h | DBh | 1: normal<br>2:screen saving gamma | |
| | | Brightness | 02h | DCh | 1:normal<br>2:decrease brightness | |
| | | Motion | 02h | DDh | 0: 0s(Off)<br>\|<br>90: 900s | 10s/step |
| | Side Border Color | | 02h | DFh | 0: Black<br>\|<br>100: White | |
| | Auto Brightness | | 02h | 2Dh | 0: Off<br>1: On | |
| | Menu tree reset (Display Protection) | | 02h | CBh | 0: None<br>9: Reset Display Protection category | Momentary |
| Advanced Option | Input Detect | | 02h | 40h | 0: First detect<br>1: Last detect<br>2: None<br>3: VIDEO detect<br>4: Custom detect | |
| | Custom Detect | Priority1 | 10h | 2Eh | 0: No mean<br>1: VGA<br>2: RGB/HV<br>3: DVI<br>4: HDMI (Set only)<br>5: Video1<br>6: Video2<br>7: S-Video<br>10: TV<br>12: DVD/HD1<br>13: Option<br>14: DVD/HD2<br>15: Display Port<br>17: HDMI | |
| | | Priority2 | 10h | 2Fh | | |
| | | Priority3 | 10h | 30h | | |
| | | Priority4 | 10h | 31h | | |
| | | Priority5 | 10h | 32h | | |
| | Input change | | | | N/A | |
| | Long Cable Manual | Equalize | 10h | 3Dh | 0: No mean<br>1: Off<br>2: On | |
| | | Pole | 10h | 36h | 0:<br>\|<br>255(FFh): | |
| | | Peak | 10h | 37h | 0:<br>\|<br>255(FFh): | |
| | | Gain | 10h | 38h | 0:<br>\|<br>255(FFh): | |
| | | Offset | 10h | 39h | 0:<br>\|<br>255(FFh): | |

| | Item | OP code page | OP code | Parameter | Remarks |
|---|---|---|---|---|---|
| | SYNC Terminate | 02h | E1h | 1: Hi(2.2kohm)<br>2: Lo(75ohm) | |
| | DVI Mode | 02h | CFh | 1: DVI-PC<br>2: DVI-HD | |
| | BNC Mode | 10h | 7Eh | 0: No operate<br>1: RGB<br>2: Component<br>3: Video | |
| | SCART Mode | 02h | 9Eh | 0: Off<br>1: On | |
| | HDMI Signal | 10h | 40h | 0: None<br>1: Expand<br>2: Raw | |
| | Scan Conversion | 02h | 25h | 1: Off(INTERLACE)<br>2: Enable<br>(IP ON/PROGRESSIVE) | |
| | Color System | 02h | 21h | 1: NTSC<br>2: PAL<br>3: SECAM<br>4: Auto<br>5: 4.43NTSC<br>6: PAL-60 | |
| | Scan Mode | 02h | E3h | 1: Under Scan<br>2: Over Scan | |
| | Menu tree reset (Advanced Option) | 02h | CBh | 0: None<br>10: Reset Advanced option category | Momentary |
| | Menu tree reset (Factory reset) | 02h | CBh | 0: None<br>1: Factory Reset | Momentary |
| | Input | 00h | 60h | 0: No mean<br>1: VGA<br>2: RGB/HV<br>3: DVI<br>4: HDMI (Set only)<br>5: Video1<br>6: Video2<br>7: S-Video<br>10: TV<br>12: DVD/HD1<br>13: Option<br>14: DVD/HD2<br>15: Display Port<br>17: HDMI | |
| | Audio Input | 02h | 2Eh | 1: Audio 1(PC)<br>2: Audio 2<br>3: Audio 3<br>4: HDMI<br>6: TV/Option<br>7: Display Port | |
| | Volume UP/Down | 00h | 62h | 0: whisper<br>\|<br>100: loud | |
| | Mute | 00h | 8Dh | 0,2: UNMUTE<br>1: MUTE | |
| | MTS | 02h | 2Ch | 0: None<br>1: Main<br>2: Sub<br>3: Main + Sub | This operation requires supported option TV tuner. |
| | Sound | 02h | 34h | 1: Off<br>2: Low (or On)<br>3: High (or On) | Not available on X461UN. |

| | Item | OP code page | OP code | Parameter | Remarks |
|---|---|---|---|---|---|
| | Picture Mode | 02h | 1Ah | 1: sRGB<br>3: Hi-Bright<br>4: Standard<br>5: Cinema<br>6: ISF-Day<br>7: ISF-Night<br>11: Ambient-1<br>12: Ambient-2 | sRGB:<br>PC mode only<br>Cinema:<br>A/V mode only<br><br>ISF-Day:<br>ISF-Night:<br>Each needs an adjustment by ISF. |
| | Aspect | 02h | 70h | 1: Normal<br>2: Full<br>3: Wide<br>4: Zoom | Wide:<br>A/V mode only |
| | PIP ON/OFF<br>Still ON/OFF | 02h | 72h | 1: Off<br>2: PIP<br>3: POP<br>4: Still<br>5:Side by side (aspect)<br>6: Side by side (Full) | |
| | PIP Input | 02h | 73h | 0: No mean<br>1: VGA<br>2: RGB/HV<br>3: DVI<br>4: HDMI (Set only)<br>5: Video1<br>6: Video2<br>7: S-Video<br>10: TV<br>12: DVD/HD1<br>13: Option<br>14: DVD/HD2<br>15: Display Port<br>17: HDMI | This operation has limitation of selection. Please refer to the monitor instruction manual. |
| | Still Capture | 02h | 76h | 0: Off<br>1: Capture | Momentary |
| | Signal Information | 02h | EAh | 0: No Action<br>1: Off (No indication)<br>2: On (Indication) | |
| | Auto Setup | 00h | 1Eh | 1: Execute | Momentary |
| | TV-Channel UP/DOWN | 00h | 8Bh | 0: No Action<br>1: Up<br>2: Down | This operation requires supported option TV tuner. |
| Temperature sensor | Select Temperature sensor | 02h | 78h | 1: Sensor #1<br>2: Sensor #2<br>3: Sensor #3 | |
| | Readout a temperature | 02h | 79h | Returned value is 2's complement. Refer to section 6.2 | Read only |
| Carbon footprint | Readout carbon footprint (g) | 10h | 10h | 0:<br>\|<br>999: | Read only |
| | Readout carbon footprint (kg) | 10h | 11h | 0:<br>\|<br>65535: | Read only |

**All data are subject to change without notice.**

(Revised at Mar.25/2010)

**Copyright 2004-2009 NEC Display Solutions, Ltd. All Right Reserved**
This document provides the technical information for users. NEC Display Solutions, Ltd. reserves the right to change or modify the information contained herein without notice. NEC Display Solutions, Ltd. makes no warranty for the use of its products and bears no responsibility for any errors or omissions which may appear in this document.